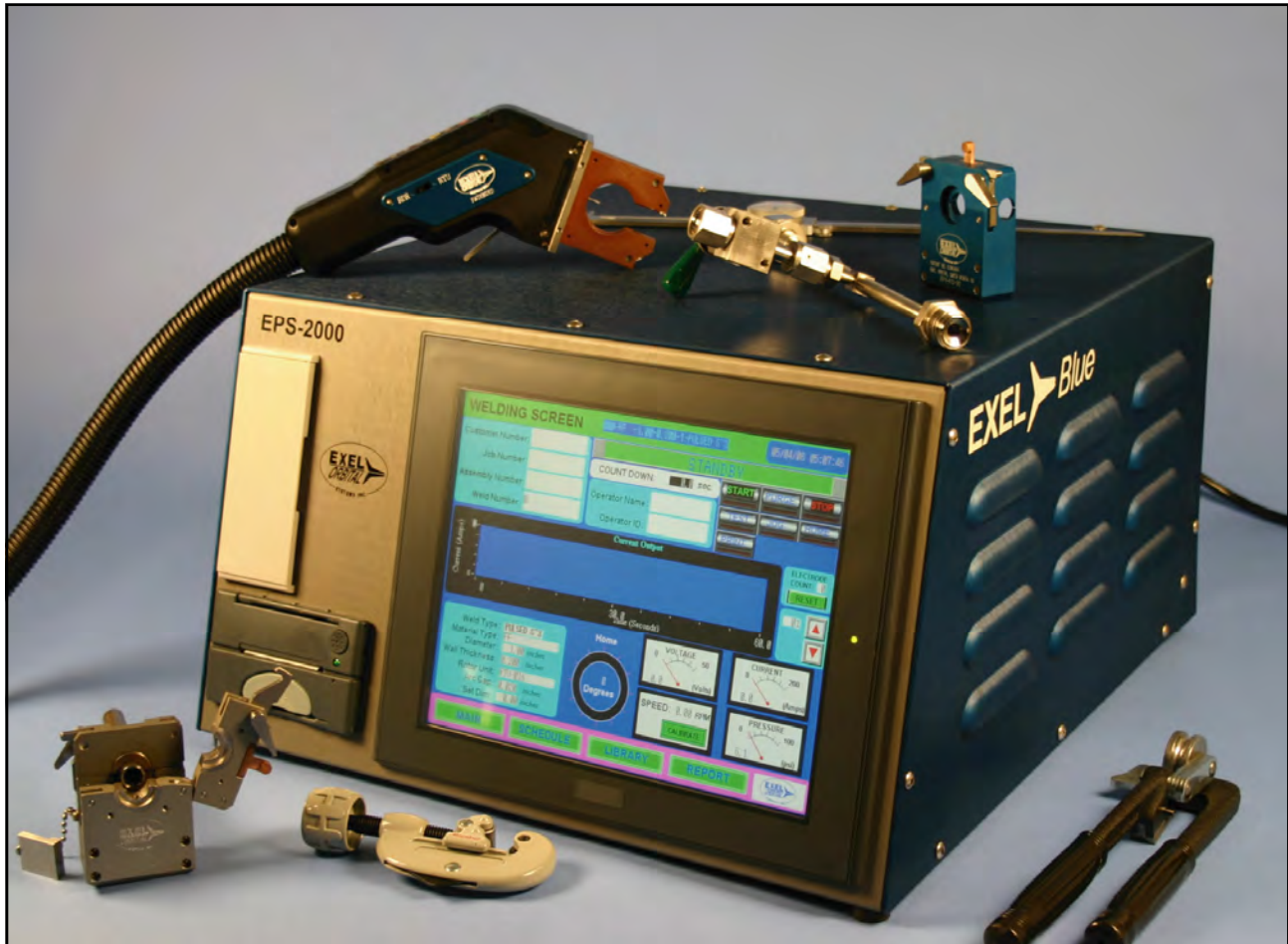




## Model EPS-2000 Power Supply



# Operation Manual

**MODEL EPS-2000  
OPERATION MANUAL**



## **NOTICE**

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Information and instructions in this document are subject to change and Exel Orbital Products reserves the right to change specifications and data without notice.

### **Revision History**

Revision	ECO No.	Change Description	Date	Appr.
A	N/A	Initial release	3/17/09	S.C.



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## 1.0 SAFETY PRECAUTIONS

The Model EPS-2000 power supply provides GTAW current with pulsation controls, high frequency arc starting, purge gas controls, weld head arc rotation and automatic timing functions. Users need only to supply input AC power, a regulated gas source with flow meter and the appropriate weld head.

### WARNING

ICON KEY	
	Warning
	Electrical Hazard

The nature of the GTAW process creates some POTENTIAL HAZARDS. In accordance with international safety regulations the EXCLAMATION SYMBOL indicates that this equipment is considered HAZARDOUS. The LIGHTNING FLASH SYMBOL indicates that there are potential electrical hazards. The use and display of these symbols make it the **OPERATOR'S RESPONSIBILITY TO ENSURE THAT HE HAS READ AND/OR BEEN MADE AWARE OF ALL OF THE SAFETY-RELATED ITEMS CONTAINED IN THIS MANUAL.**

### 1.1 SHOCK HAZARD WARNING

“High Voltage” is present on exposed internal terminals. The ELECTRODE (tungsten and fusion weld head rotors) is also an “exposed terminal” and by its nature the GTAW process requires electrical potential to be present on the electrode during arc starting and during welding.



**All EXEL Power Supplies contain a “bleeder” circuit to ground any residual potential after welding or after an aborted or bad arc start attempt. These circuits take a few seconds to operate or could fail.**



**The electrode should always be considered a possible shock hazard. This is especially true when the system is in “weld sequence”, ready to weld, is welding or has just finished welding. Equipment/component failure, system abuse or improper maintenance could result in electrical potential at the weld head even when not in “weld sequence”.**



**The users/operators of this equipment must take all precautions necessary to avoid contact with the ELECTRODE at “ALL TIMES”. The only exception is when actually replacing or adjusting the electrode and this should be done WITH THE POWER TURNED OFF.**



**If performed with the power “ON” the system must be in “TEST” mode out of weld sequence and the USER MUST OBSERVE COMMON SAFETY PRACTICES such as grounding the electrode to ensure discharge before actually touching it.**













**Most EXEL Power Supplies feature High Frequency (HF) Arc Starting. This is a High Voltage/High Frequency electrical transmission process. To eliminate any HF shock possibility “AVOID ALL CONTACT” with the Welding WORK (ground), the ELECTRODE or the WELD HEAD during arc start.**



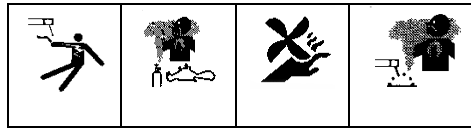
**Remember, there is a possible shock hazard in all welding power supplies at ALL times.**

## 1.2 WARNING LABEL DEFINITIONS

The table below contains caution and warning labels for the operation of this equipment. Before operating this or any welding equipment users should be familiar with "**ANSI-49.1 Safety in Welding and Cutting**".

	<b>ELECTRIC SHOCK</b> from welding electrode or wiring can kill.
	<b>HIGH FREQUENCY RADIO WAVE</b> can cause interference and sometimes even damage to nearby electronic equipment (such as computers) that are un-protected.
	<b>MAGNETIC FIELDS</b> can affect implanted medical devices. Wearers of pacemakers should keep away until consulting their doctor.
	Welding can cause <b>FIRE OR EXPLOSIONS</b> . Do not weld near <b>FLAMMABLE</b> or <b>EXPLOSIVE MATERIALS</b> . Have proper type of extinguisher in work area.
	<b>WEAR NON-FLAMMABLE</b> protective clothing, footwear and head gear at all times.
	<b>HOT PARTS</b> can cause severe burns. Do not touch recently welded components. Avoid touching torch components and welding fixtures soon after welding.
	<b>ARC RAYS</b> can burn the eyes and skin. The welding arc emits ultra-violet (UV) radiation and the molten weld gives off infra-red. Both can burn eyes and skin if unprotected. Suitable eye and skin protection must be worn.
	<b>BUILD UP OF GAS</b> can injure or kill. Weld materials can emit toxic fumes during welding. <b>WELD ONLY IN AREAS WITH ADEQUATE VENTILATION.</b>
	<b>FUMES AND GASES</b> can be hazardous. Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health. <b>DO NOT</b> weld in enclosed areas without proper ventilation or respirators.
	<b>MOVING PARTS</b> - Keep hands and fingers clear from fans, gears, rotors, wire feed, Rotation and AVC Mechanisms.

## 2.0 START-UP



### 2.1 UNPACKING THE POWER SUPPLY

1. The EPS-2000 comes in a water tight, rolling carrying case which is suitable for shipment (hard case option). Open by unlatching the six (6) latches



2. If the lid does not open there may be a vacuum inside due to air travel. Push the pressure release button then open the lid.



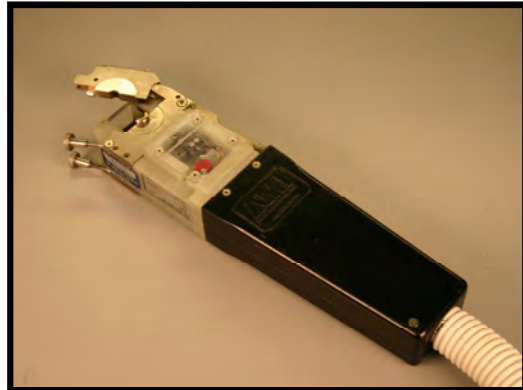
3. The operations manual, line cord and purge connector are located in the bottom of the case.



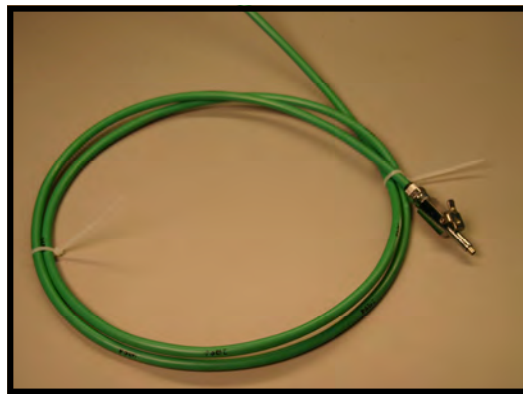
**Always place the EPS-2000 Power Supply on a stable work surface.**

## 2.2 REQUIRED PERIPHERALS

1. A Welding Head is required to operate the EPS-2000. Below is the Exel RDR-05 Rotor Driver and an Arc Machines orbital welding head.



2. The line cord provided is 20 amp rated for 250 volt service (left) and a purge connector to use as a source of purge for the power supply.

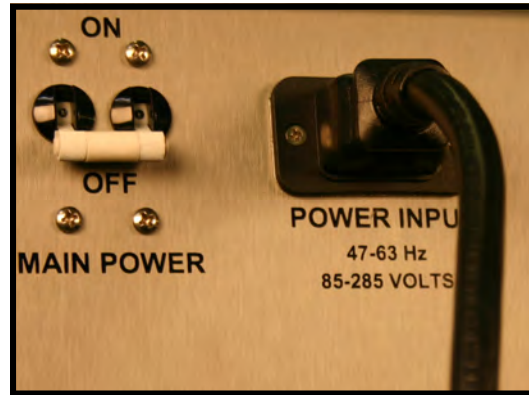
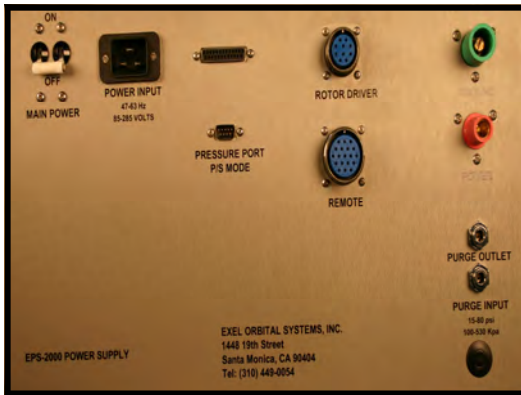


### Note

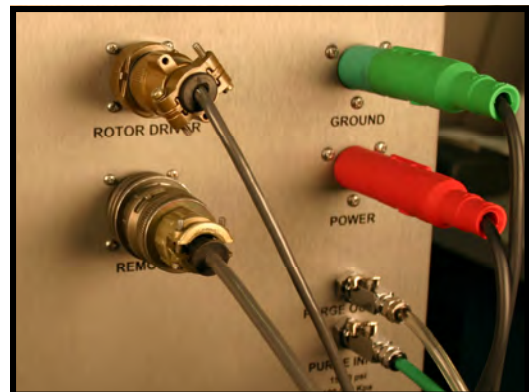
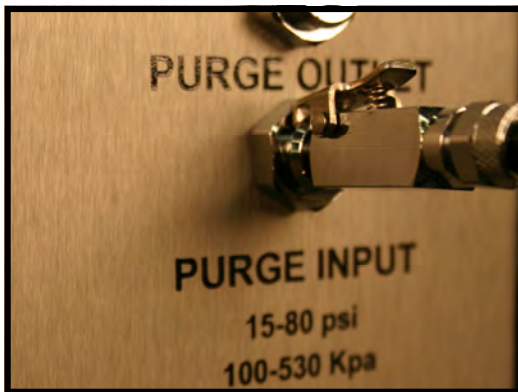
*It may be necessary to cut off the plug provided on the line cord and replace it with one suitable for the outlet being used*

## 2.3 POWER SUPPLY HOOKUP

1. Below left is a view of the back of the EPS-2000 Power Supply with all necessary connectors visible. Insert the A/C line plug into power ranging from 85 to 265 volts and from 47 to 63 hertz single phase.



2. Connect the Argon or mixed gas purge inlet from the source to the power supply. Connect the power, ground, motor gas and remote (if applicable) of the welding head to the power supply.

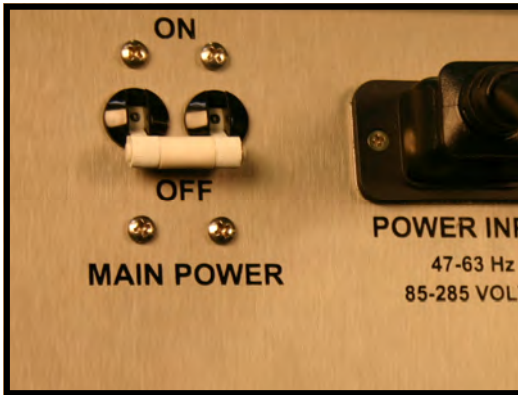


### Note

- The EPS-2000 does not require a dedicated circuit.
- Power Input: 85 to 265 volts and 47 to 63 hertz
- Purge Input: 15 to 80 psi or 100 to 530 Kpa.

## 2.4 POWER-UP

1. Turn the main power switch on. The Main Screen will appear on the touch screen. Select the desired language then touch any spot on the screen to continue.



2. If Password protection is selected enter password here (1), hit <ENTER> then OK (2). The Library Screen appears so that a weld schedule may be created or loaded from memory.



## 3.0 LIBRARY AND MEMORY

### 3.1 LOADING A WELD SCHEDULE FROM THE MAIN MEMORY

1. Select the desired weld schedule from the Main Memory in the left column. Select Load Schedule.

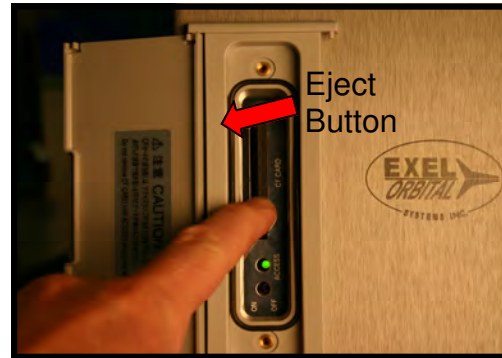


2. The selected weld schedule appears on the screen.

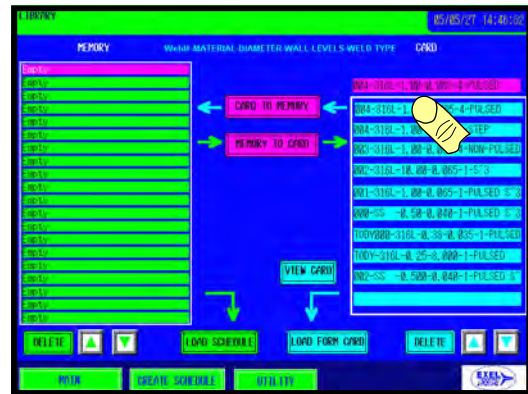
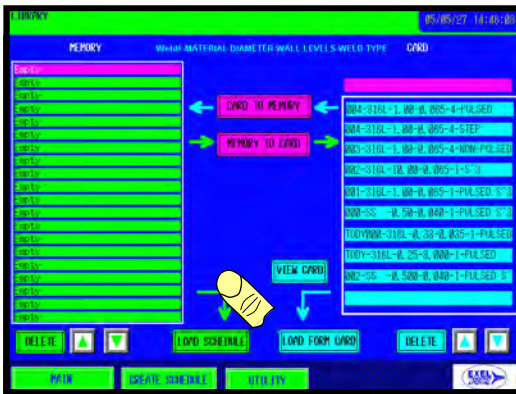


## 3.2 LOADING A WELD SCHEDULE FROM THE CF CARD

1. Orient the CF Card as shown. Insert the CF Card. Ensure that it is seated completely into the slot. The ejector button should pop up.



2. Touch the VIEW CARD button and all weld schedules in the card will be displayed in the right column. Select the desired schedule and the name will appear in the pink window above the right column.



3. Touch LOAD FROM CARD and the weld schedule will load.



### 3.3 MOVING A WELD SCHEDULE FROM CF CARD TO MAIN MEMORY

1. Select the desired weld schedule to transfer to main memory and it will appear in the pink window. Select CARD TO MEMORY and the weld schedule will be copied to the Main Memory in the left column



### 3.4 MOVING A WELD SCHEDULE FROM MAIN MEMORY TO CF CARD

1. Select the desired weld schedule to transfer to the CF Card. Select MEMORY TO CARD and the weld schedule will be copied to the CF Card in the right column.



## 4.0 CREATE A WELD SCHEDULE

### 4.1 CREATE A WELD SCHEDULE – 4 LEVEL WELD

1. From the LIBRARY screen touch CREATE SCHEDULE. The following screen appears.

The screenshot shows the 'SCHEDULE SCREEN' with the following fields and values:

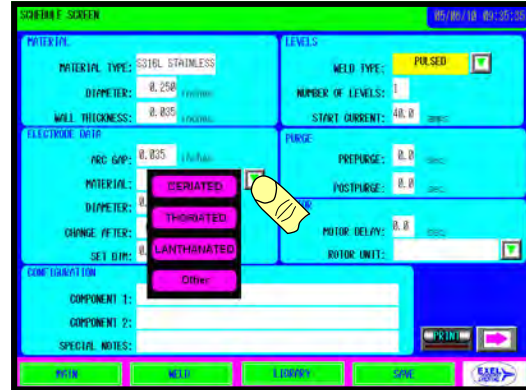
- MATERIAL TYPE:** [Empty field]
- DIAMETER:** 0.000 inches
- WALL THICKNESS:** 0.000 inches
- ELECTRODE DATA:**
  - ARC GAP:** 0.000 inches
  - MATERIAL:** [Dropdown menu]
  - DIAMETER:** 0.000 inches
  - CHANGE PETER:** 0 inches
  - SET DIM:** 0.000 inches
- LEVELS:**
  - WELD TYPE:** PULSED
  - NUMBER OF LEVELS:** 1
  - START CURRENT:** 40.0 amps
  - PURGE:**
    - PREPURGE:** 0.0 inches
    - POSTPURGE:** 0.0 inches
  - MOTOR:**
    - MOTOR DELAY:** 0.0 inches
    - ROTOR UNIT:** [Dropdown menu]
- COMPONENT 1:** [Empty field]
- COMPONENT 2:** [Empty field]
- SPECIAL NOTES:** [Empty field]

Buttons at the bottom: HOME, WELD, LIBRARY, SCHEDULE, and a power button.

2. Enter the Material Type that will be welded by touching the field and using the QWERTY keypad that appears.

This screenshot is identical to the previous one, but with a QWERTY keypad overlaid on the 'MATERIAL TYPE' field. A yellow callout bubble with the number '1' is pointing to the 'MATERIAL TYPE' field. The keypad includes letters, numbers, and symbols, with an 'ENT' key at the bottom right.

- Fill in all the Material Fields then enter the Electrode Data and select the electrode material from the pull down menu. Note: CHANGE AFTER warns the operator to change the electrode.



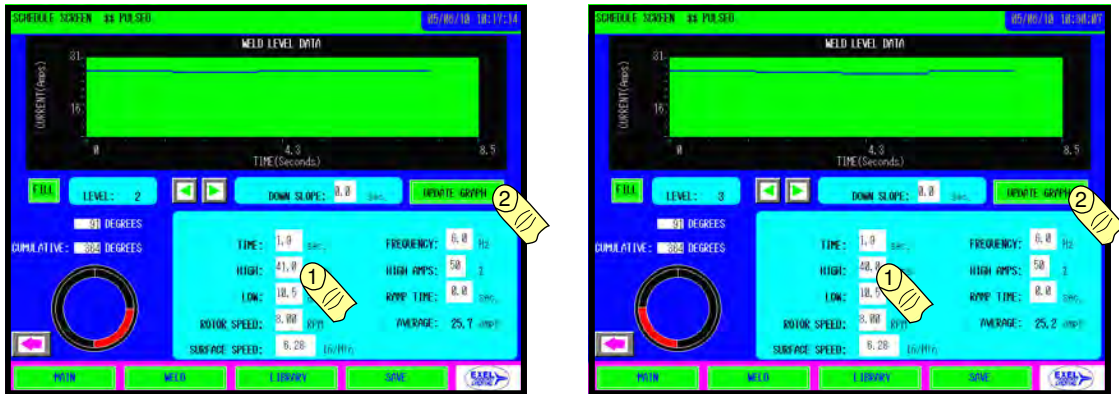
- In the Levels category select the Weld Type to be made and push the right arrow to move to the second Schedule Screen.



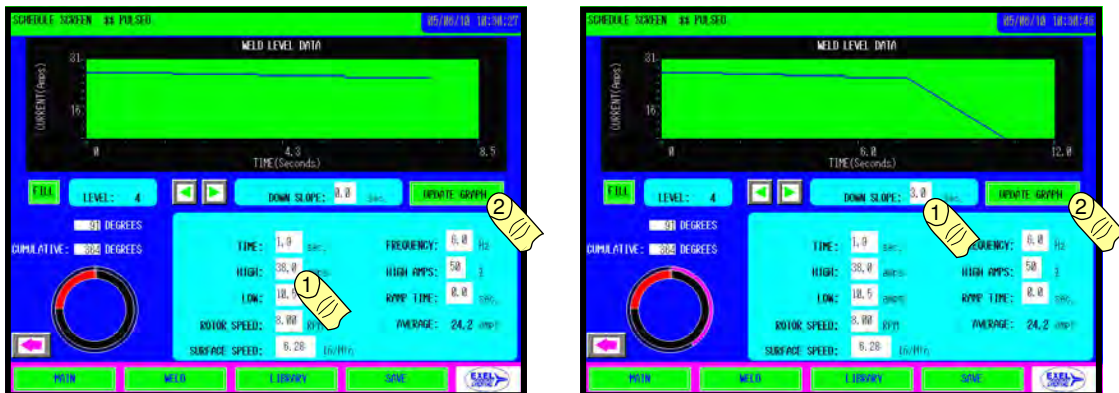
- Enter Level 1 data and click UPDATE GRAPH, both the polar and linear graph of time, current and rotation are shown. Note: With a multi level weld it is convenient to click the fill button to copy Level 1 information to all subsequent levels (below right).



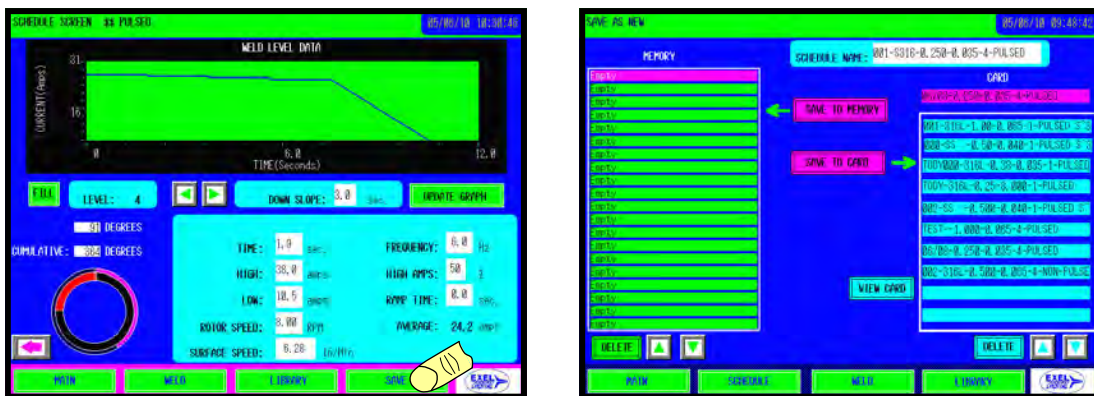
- Level 2 contains the same information as level 1. Change the relevant field, in this case 41 High amps. UPDATE GRAPH. Edit Level 3 in the same manner as Level 2 and UPDATE GRAPH to confirm changes.



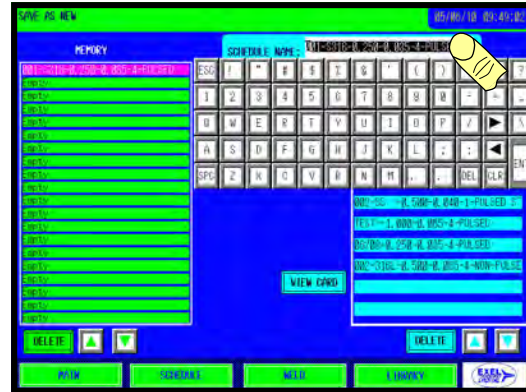
- Edit Level 4 and UPDATE GRAPH. Enter a Down Slope and UPDATE GRAPH. The 4 Level Pulsed Weld Schedule is now complete.



- To save the newly created weld schedule touch SAVE. The Library Menu appears in Save As mode which displays a default name in the Schedule Name field.

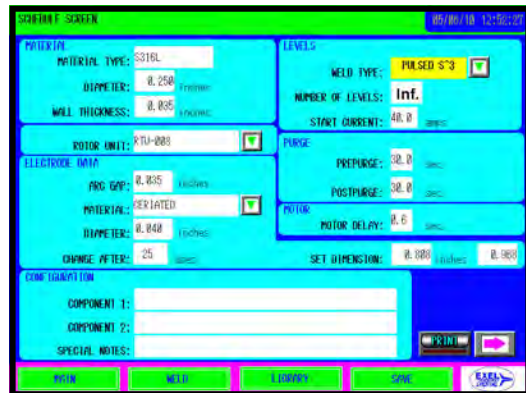
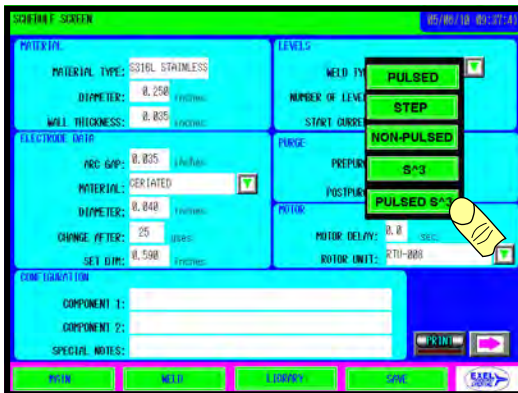


- Click SAVE TO MEMORY to save the schedule in internal memory or SAVE TO CARD to save to the CF Card. If the default name is undesired touch the SCHEDULE NAME field and a KWRTY keypad appears to rename.

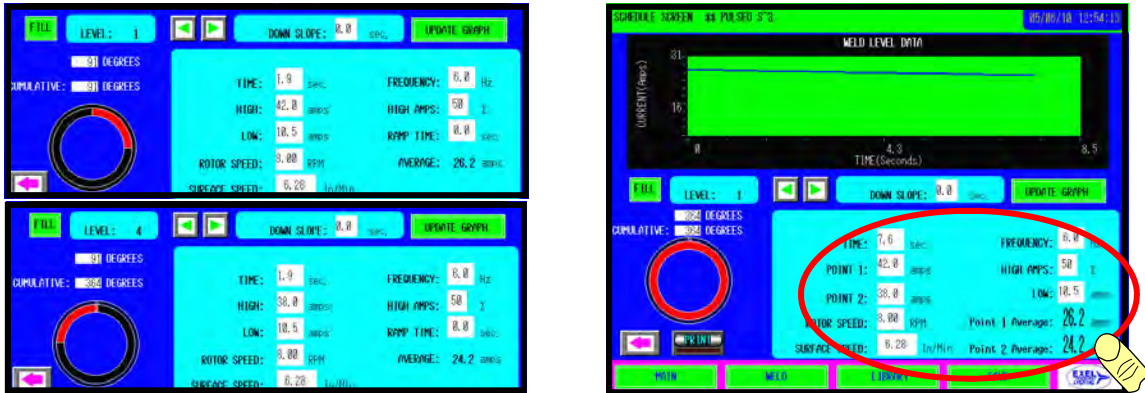


## 4.2 CREATE A WELD SCHEDULE – S<sup>3</sup>

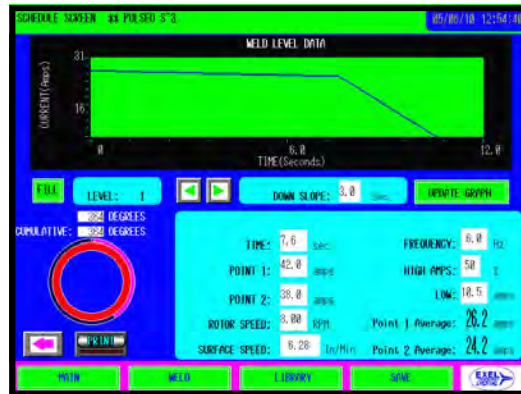
- In SCHEDULE SCREEN 1 select PULSED S<sup>3</sup> as the Weld Type. Notice that Number of Levels shows INF (below right), this denotes there are infinite levels.



- Refer back to the multi-level weld developed on the previous pages. Use the settings for Level 1 and Level 4 (below left). Input Level 1 High amps for Point 1 and Level 4 High amps for Point 2. Time is the total of Level 1, 2, 3, & 4 times from the Multi-Level weld.



- The S<sup>3</sup> Weld is complete.

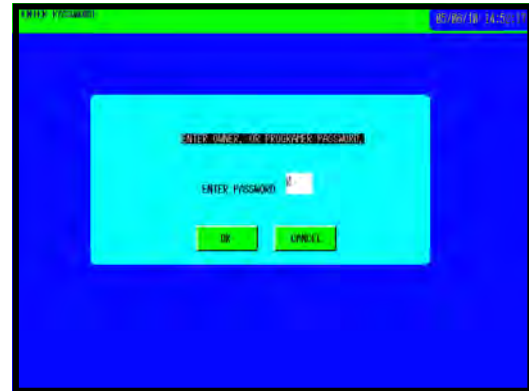


- Below are the values entered for a 4 Level weld for 1/4" diameter, .035 wall 316L Stainless Steel.

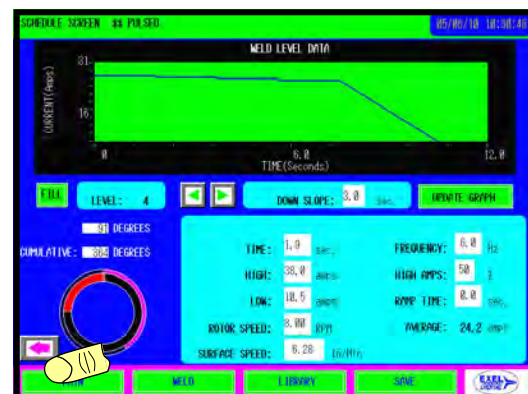
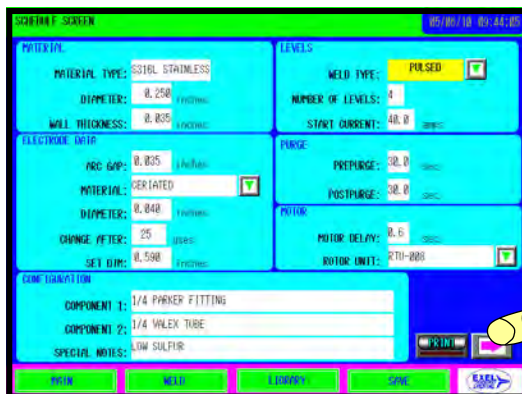
Lev	Time	High	Low	Freq	% High	Speed
1	1.9	4.2	10.5	6	50	8
2	1.9	41	10.5	6	50	8
3	1.9	40	10.5	6	50	8
4	1.9	38	10.5	6	50	8

## 4.3 VIEWING OR MODIFYING A SCHEDULE

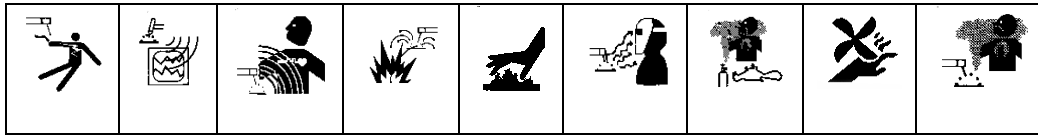
1. From the WELD Screen touch the SCHEDULE button. Enter the Programmer Password which gives access to the weld schedule. See Section 6.0 UTILITY for passwords.



2. The first screen to appear is Schedule Screen 1. Click the Right Arrow to move to Schedule Screen 2. Click the Left Arrow to move back to Schedule Screen 1.



## 5.0 MAKING A WELD

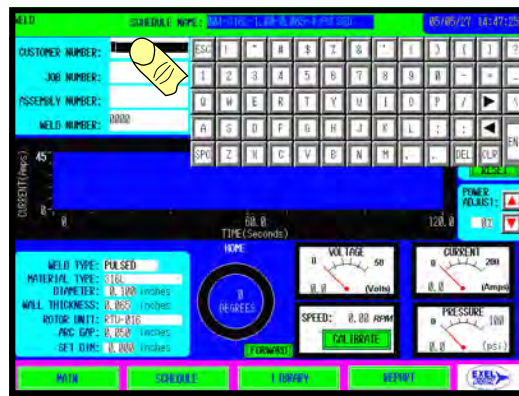


### 5.1 WELD TRACKING INFORMATION

**Note**

To open or create a weld schedule see Section 3.0 LIBRARY AND MEMORY or Section 4.0 CREATE A WELD SCHEDULE.

1. When a weld schedule loads there are several fields that can be filled which allow tracking of a weld in the REPORT. Touch the field where information is to be entered and a QWERTY keypad appears.

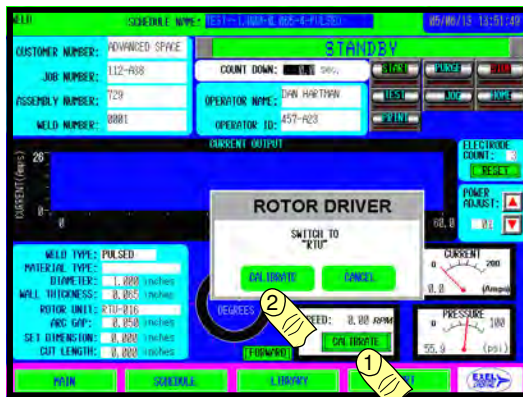


2. Press ENTER when complete and continue filling in all remaining fields. This information will appear on the Weld Report (below right).

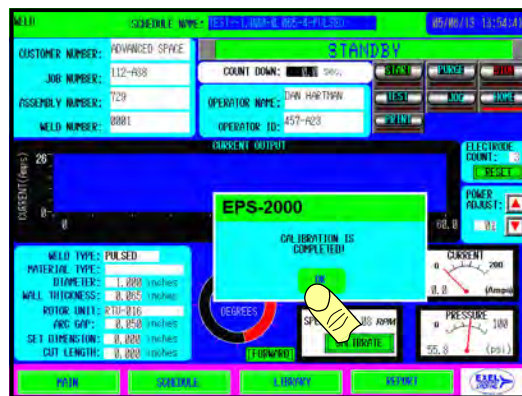


## 5.2 CALIBRATING THE ROTOR DRIVER

1. When loading a new weld schedule or turning power on the Rotor Driver or motor must first be calibrated. Push the CALIBRATE button then select the proper switch setting on the Rotor Driver then push CALIBRATE.



3. During the calibration 4 revolutions will be made and timed. When calibration is complete, push OK.



## 5.3 MAKING A TEST WELD

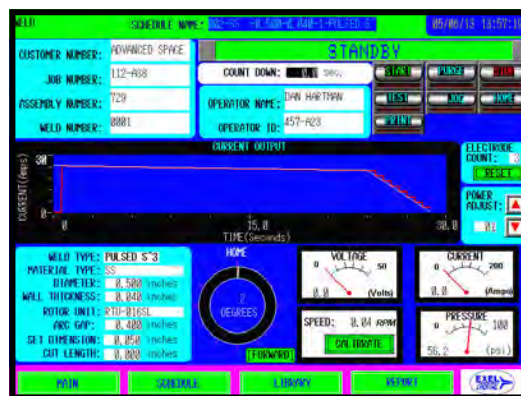
1. After Rotor Driver calibration a test weld can be made to be certain of proper settings and calibration by pushing TEST.



2. As the power supply cycles through the test sequence it purges, rotates the weld head and graphs theoretical current.



3. When TEST is complete the power supply will return to its STANDBY mode.



## 5.4 MAKING A WELD

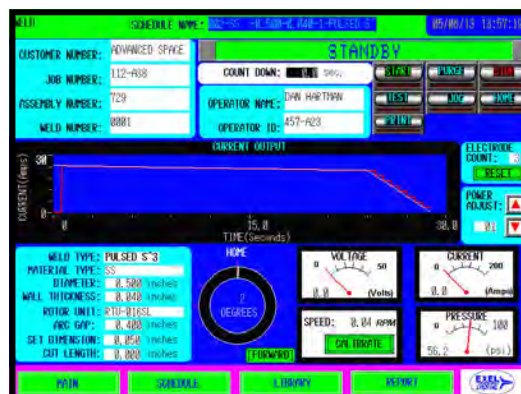
1. To make a weld be sure that the weld head is ready and properly fixtured then push START.



2. The power supply will cycle through the weld sequence, displaying all critical operating variables.

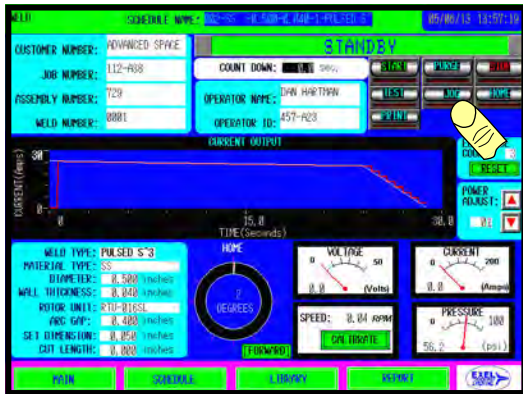


3. When the weld is complete the power supply returns to STANDBY mode.

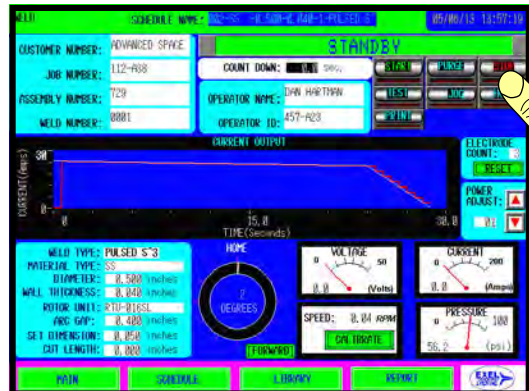
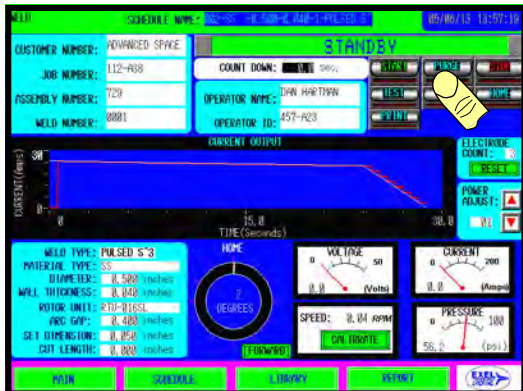


## 5.5 JOG, HOME, PURGE AND STOP

1. Push the JOG button to rotate the weld head. The head will rotate only when the button is pushed. To home the weld head push the HOME button.



2. Purge may be used at any time by pressing PURGE. Pressing PURGE prior to a weld does not affect weld purging. STOP may be used at any time and will terminate any sequence started. During a weld, pre-purge will be the final sequence.



## 6.0 UTILITY, PASSWORDS, PRINTING, REPORTS AND FAULTS

### 6.1 UTILITY

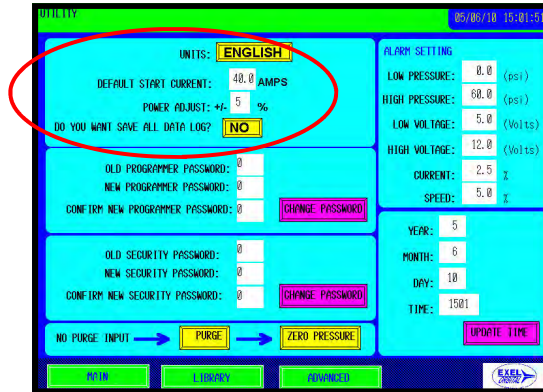
1. Push anywhere on the MAIN Menu then



2. Press UTILITY from the LIBRARY Menu

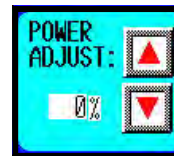


- UNITS:** ENGLISH or METRIC may be selected when toggling from one to the next. The units are changed throughout the program and conversions are automatically made.



- DEFAULT START CURRENT:** The default current used to initiate the arc start of the weld is 40 amps. This is the instantaneous current to establish the arc from the electrode. This value can be adjusted from 25 to 40 amps.

**POWER ADJUST:** This value establishes the adjustment the operator is given during welding. This value is given as a % of the programmed current. The operator has the ability to adjust power in 1% increments up or down to the programmed limit in POWER ADJUST.



- DO YOU WANT TO SAVE ALL DATA LOG:** Answer YES or NO. If you answer NO weld reports will not be saved and can only be printed immediately following the weld, subsequent welds will overwrite the report. If you answer YES weld reports will be saved to the CF Card in Microsoft Excel format in the LOG Folder. The weld report may be printed after the weld.



## 6.2 ALARM SETTINGS

**LOW PRESSURE:** Since the EPS-2000 has a pressure transducer a low alarm limit may be set. Should the pressure drop below this point the alarm will show on the touch screen.

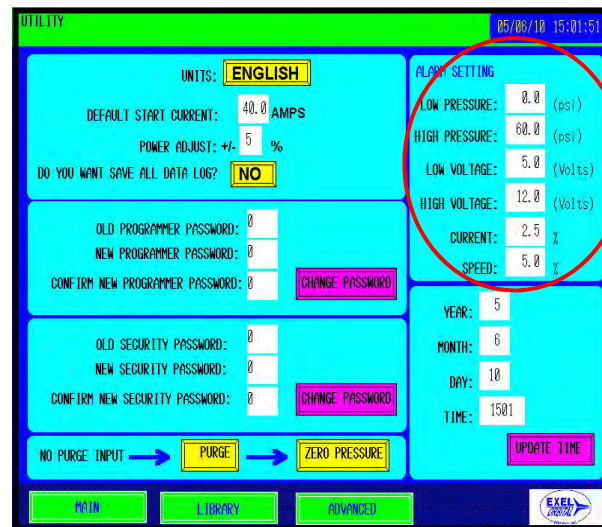
**HIGH PRESSURE:** The highest allowable pressure desired for the purge inlet of the power supply. This value should never exceed 80 psi (530 kpa).

**LOW VOLTAGE:** The minimum allowable voltage. This setting is often used to indicate stub out or insufficient gap between the electrode and work. This value is usually set at 5 volts.

**HIGH VOLTAGE:** The maximum allowable voltage. This setting is used to indicate excessive gap between the electrode and work and other anomalies such as insufficient or missing purge. This value is usually set at 12 volts.

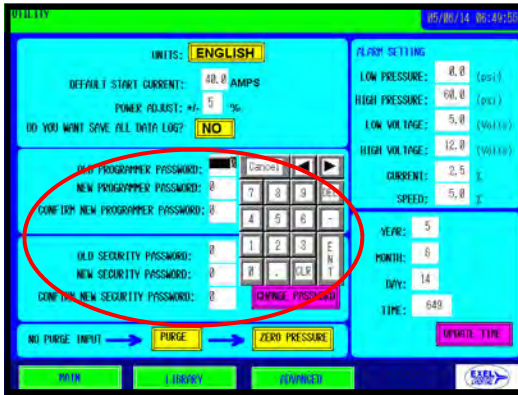
**CURRENT:** The tolerance in terms of % variation from the average current programmed. This should be set based on the requirements of the welding operation. In this case +/- 5% is set.

**SPEED:** The tolerance in terms of % variation from the programmed speed. This should be set based on the requirements of the welding operation. In this case +/- 5% is set.



## 6.3 PASSWORDS

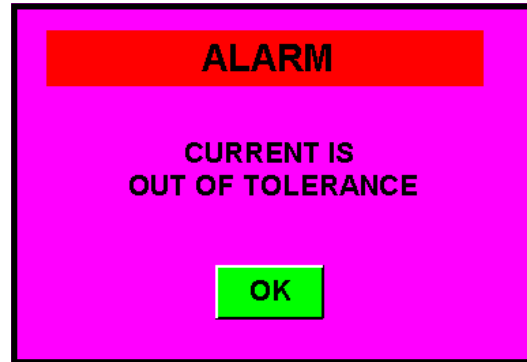
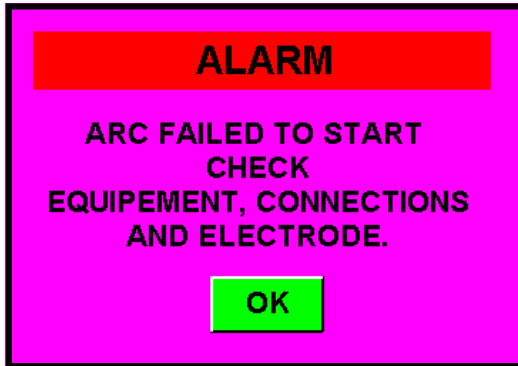
1. Enter the desired password for both Programmer and Security (see list below for privileges). The Security Screen shown below allows the user to enter either a Security Password or a Programmer Password.



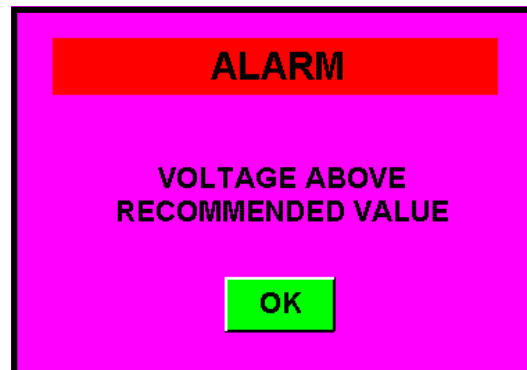
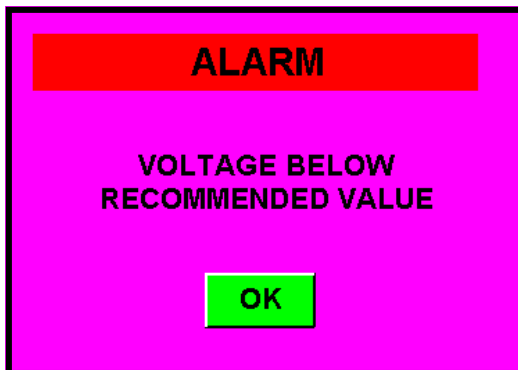
2. Security Password Allows:
  - Access to the LIBRARY
  - Access to Weld Screen
  - % adjustment of the weld schedule.
  - Print weld schedule
  - Print weld report
  - View weld report
  - Memory copy and from CF Card
3. Programmer Password Allows:
  - All items on Security Password
  - Access to Weld Schedule screen
  - Access to Utility screen

## 6.4 ALARMS AND FAULTS

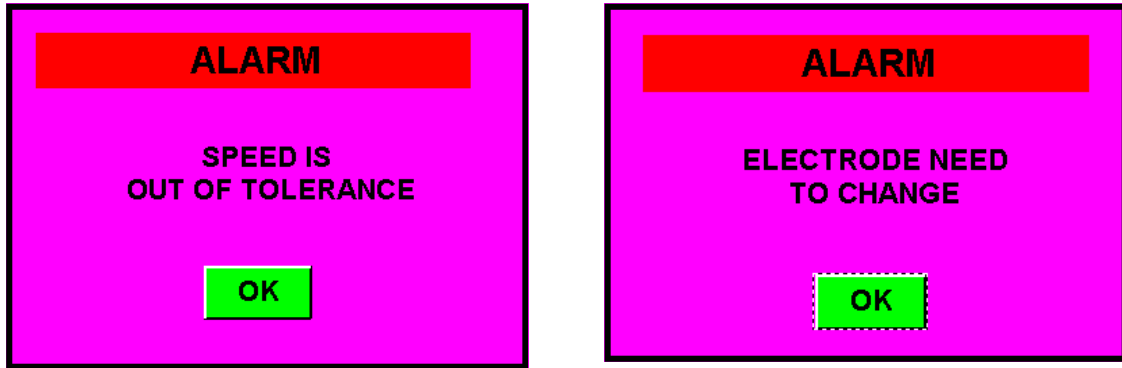
1. The message below left will appear if current fails to flow through the electrode after an attempted arc start. The message below right will appear if current deviates outside the alarm set value. See Section 6.2 ALARM SETTINGS.



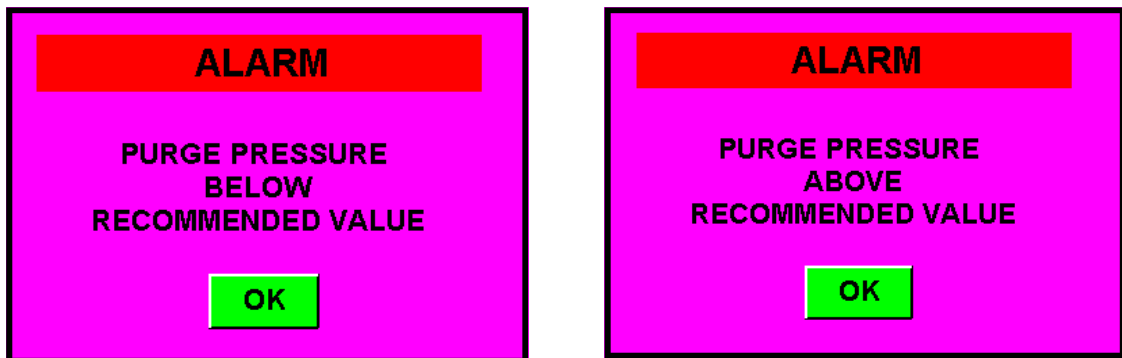
2. The message below left will appear if voltage goes below the alarm set value. The message below right will appear if voltage goes above the alarm set value. See Section 6.2 ALARM SETTINGS.



3. The message below left will appear if speed deviates outside the alarm set value. See Section 6.2 ALARM SETTINGS. The message below right will appear to alert that the operator must change the electrode. See Section 4.0 CREATING A WELD SCHEDULE.



4. The message below left will appear if pressure goes below the alarm set value. The message below right will appear if pressure goes above the alarm set value. See Section 6.2 ALARM SETTINGS.

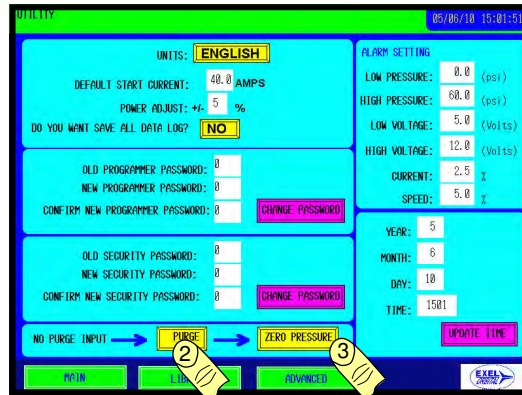


## 6.5 ZERO THE PRESSUER TRANSDUCER

1. If the pressure gauge on the welding screen does not read zero after the gas supply has been disconnected and the valve opened it will be necessary to zero the pressure transducer.
  - Disconnect the gas supply
  - Push the PURGE button in the Utility Menu
  - Push ZERO PRESSURE

**MODEL EPS-2000  
OPERATION MANUAL**

- Go back to the Weld screen and the pressure gauge should read “0” zero.



## 6.6 PRINTING

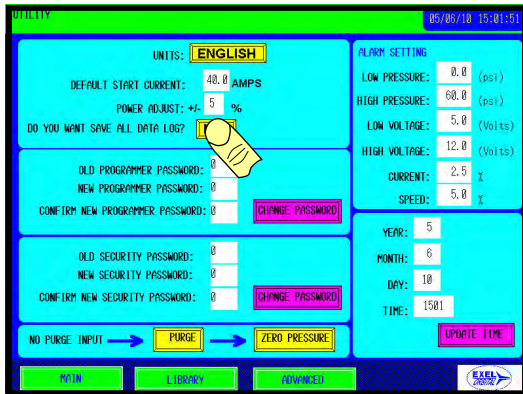
1. To print from the power supply select either PRINT SCHEDULE or PRINT REPORT. The onboard printer will print the desired form.



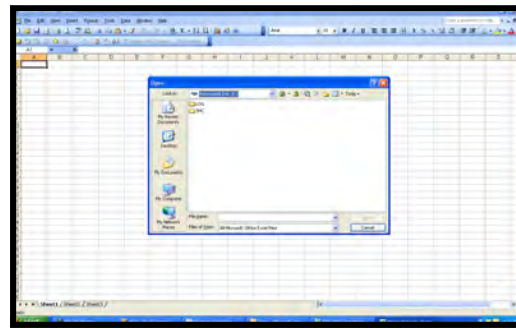
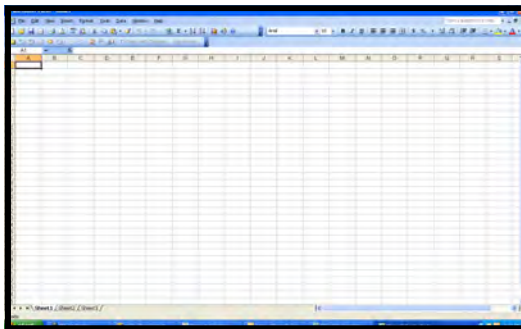
Thermal Printer

## 6.7 WELD REPORT

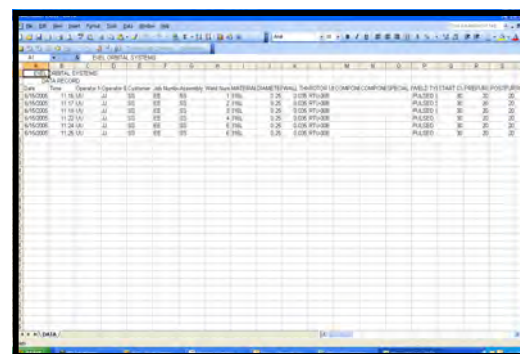
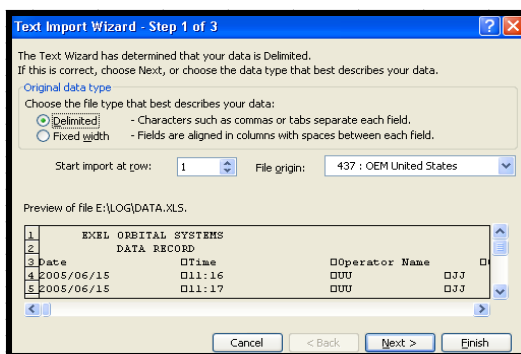
1. By selecting YES on “DO YOU WANT TO SAVE ALL DATA LOG?” all weld reports will be saved to the CF Card. To view the weld reports simply remove the CF Card and insert into the CF Card reader of your computer.



2. Open Microsoft Excel. Click FILE then OPEN and go to the location of the CF Card. Open LOG and then the file called DATA.



3. The box below appears. Click NEXT then NEXT again at the following box then click FINISH. Excel populates the spreadsheet with the weld report data.





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